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Comparison of Terbuthylazine and Atrazine Preemergence in Grain Sorghum

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Abstract

Terbuthylazine is an atrazine analog that is used in Europe as a replacement for atrazine. This study compares terbuthylazine with common herbicide tank mixes for weed control in this region. All herbicides controlled quinoa and crabgrass 95% or more, whereas Bicep II Magnum controlled kochia, Palmer amaranth, and Russian thistle the best late in the season. No herbicide visibly injured grain sorghum in this experiment. Grain yields increased 18 to 32 bu/a when herbicides were applied compared to the nontreated controls except with atrazine at 24 oz/a.

Keywords

triazine herbicides, residual control

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Comparison of Terbuthylazine and Atrazine Preemergence in Grain Sorghum

R.S. Currie and P.W. Geier

Summary

Terbuthylazine is an atrazine analog that is used in Europe as a replacement for atrazine. This study compares terbuthylazine with common herbicide tank mixes for weed control in this region. All herbicides controlled quinoa and crabgrass 95% or more, whereas Bicep II Magnum controlled kochia, Palmer amaranth, and Russian thistle the best late in the season. No herbicide visibly injured grain sorghum in this experiment. Grain yields increased 18 to 32 bu/a when herbicides were applied compared to the nontreated controls except with atrazine at 24 oz/a.

Introduction

Terbuthylazine is a photosynthesis-inhibiting herbicide similar to atrazine. In areas where atrazine use is restricted, such as Europe, terbuthylazine is used for preemergence weed control in corn. In the United States, terbuthylazine is not currently marketed as an herbicide. This study was conducted to compare terbuthylazine with atrazine for weed control in grain sorghum.

Experimental Procedures

An experiment was conducted at the Kansas State University Southwest Research-Extension Center near Garden City, KS, to compare terbuthylazine and atrazine alone and in combinations for preemergence weed control in grain sorghum. All herbicides were applied using a tractor-mounted, compressed CO_2 sprayer delivering 19.4 GPA at 4.1 mph and 30 psi. Application, environmental, and weed information are shown in Table 1. Plots were 10 by 35 feet and arranged in a randomized complete block design with four replications. Soil was a Ulysses silt loam with pH of 7.9 and 3.4% organic matter. Visual estimates of weed control were determined on July 16 and July 29, 2019. These dates were 28 and 41 days after herbicide treatment (DAT). Sorghum yields were determined by mechanically harvesting the center two rows of each plot and adjusting grain weights to 14.0% moisture.

Results and Discussion

Quinoa and crabgrass control with all herbicides was 95% or more regardless of evaluation date and did not differ (data not shown). At 28 DAT, kochia and Palmer amaranth control was 80% or more with all herbicides except terbuthylazine at 23 oz/a or atrazine at 24 oz/a (Table 2). By 41 DAT, control of each of these species was best (85%) when Bicep II Magnum (*S*-metolachlor/atrazine) at 64 oz/a was applied. All her-

bicides controlled Russian thistle similarly at 28 DAT. Bicep II Magnum provided the best Russian thistle control at 41 DAT (88%), and only terbuthylazine at 23 oz/a and atrazine at 24 oz/a were less efficacious. No visible sorghum injury was observed from any of the herbicides tested. Grain yields were increased 31 to 54% by most herbicide treatments compared to nontreated sorghum. However, sorghum treated with atrazine at 24 oz/a yielded similarly to the nontreated controls.

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Table 1. Application information

Application timing	Preemergence
Application date	June 18, 2019
Air temperature (°F)	88
Relative humidity (%)	62
Soil temperature (°F)	86
Wind speed (mph)	3 to 6
Wind direction	West-southwest
Soil moisture	Fair

Table 2. Terbuthylazine and atrazine comparisons in sorghum

			Kochia		Russian thistle		Palmer amaranth		Sorghum
Treatment	Rate	Timing[1]	28 DAT[2]	41 DAT	28 DAT	41 DAT	28 DAT	41 DAT	yield
	oz/a		% visual						bu/a
Untreated	---	---	---	---	---	---	---	---	58.6
Terbuthylazine	23	PRE	70	63	83	65	68	60	77.7
Terbuthylazine	31	PRE	80	78	86	83	80	70	76.9
Atrazine	24	PRE	78	73	88	75	73	65	66.9
Atrazine	32	PRE	81	75	90	80	81	73	80.9
Terbuthylazine Dual II Magnum	23 16	PRE PRE	84	75	88	83	80	75	78.9
Atrazine Dual II Magnum	24 16	PRE PRE	84	73	90	78	83	73	83.5
Bicep II Magnum	67	PRE	85	85	93	88	89	85	90.4
LSD (0.05)			6	7	NS	12	11	10	18.0

[1] PRE = preemergence.
[2] DAT = days after treatment.

Figure 1. Untreated control.

Figure 2. Terbuthylazine 23 oz/a applied preemergence. Photo taken 38 days after pre-emergence application.

Figure 3. Terbuthylazine 31 oz/a applied preemergence. Photo taken 38 days after pre-emergence application.

Figure 4. Atrazine 24 oz/a applied preemergence. Photo taken 38 days after preemergence application.

Figure 5. Atrazine 32 oz/a applied preemergence. Photo taken 38 days after preemergence application.

Figure 6. Bicep II Magnum 67 oz/a applied preemergence. Photo taken 38 days after preemergence application.